

What is claimed is:

1. A substrate processing apparatus comprising:

a container configured to accommodate a plurality of substrates;

a substrate processing section including at least one processing chamber in which substrates are processed;

a substrate transferring module connected to said substrate processing section, said substrate transferring module including a substrate transfer chamber, a load port disposed outside said substrate transfer chamber and configured to support said container outside said substrate transfer chamber as exposed to the ambient outside the processing apparatus, and a robot disposed within said substrate transfer chamber and operable to transfer wafers between the container supported by said load port and said substrate transfer chamber; and

a contamination controlling system including a gas inlet port connected to said substrate transfer chamber and through which purging gas is supplied into the substrate transfer chamber, and a gas circulating tube extending outside said substrate transfer chamber and connected to respective portions of said substrate transfer chamber spaced from one another along a length of the chamber such that the purging gas in the substrate transfer chamber can be re-circulated through the substrate transfer chamber via said gas circulating tube.

2. The substrate processing apparatus as claimed in claim 1, wherein said robot has a robot arm adapted to transfer the wafers one at a time.

3. The substrate processing apparatus as claimed in claim 1, wherein said container is a FOUP (Front Opening Unified Pod).

4. The substrate processing apparatus as claimed in claim 1, further comprising a loadlock chamber connecting said substrate transferring module and said substrate processing section.

5. The substrate processing apparatus as claimed in claim 1, wherein said contamination controlling system includes a source of an inert gas, and a gas supply line connecting said source of inert gas to said gas supply inlet.

6. The substrate processing apparatus as claimed in claim 5, wherein the inert gas includes nitrogen (N_2).

7. The substrate processing apparatus as claimed in claim 1, wherein said contamination controlling system further comprises a gas supply line connected to said gas supply inlet, a mass flow controller connected to said gas supply line so as to control the rate at which the purging gas is supplied into the substrate transfer chamber via said gas supply line and gas supply inlet, a sensor operable to detect the temperature and humidity in the substrate transferring chamber, and a controller connected to said sensor and to said mass flow controller so as to operate said mass flow controller on the basis of data generated from said sensor.

8. The substrate processing apparatus as claimed in claim 1, wherein the gas circulating tube extends at one side of said substrate transfer chamber from a lower portion to an uppermost portion of the substrate transfer chamber so that the purging gas re-circulated through the substrate transfer chamber through the gas circulating tube forms a laminar flow in the substrate transfer chamber.

9. The substrate processing apparatus as claimed in claim 1, wherein said substrate transferring module further comprises a filter unit comprising a fan and a filter, and said gas circulating tube is connected to said filter unit such that the purging gas flowing therethrough is supplied back into said substrate transfer chamber via said filter.

10. A method of processing a substrate comprising:

(a) providing purging gas into a substrate transfer chamber, and re-circulating the purging gas through the substrate transfer chamber;

(b) loading a container, containing a plurality of substrates, onto a load port disposed outside of the substrate transfer chamber;

(c) transferring the substrates from the container on the load port into the substrate transfer chamber using a robot disposed within the substrate transfer chamber;

(d) transferring the substrates from the substrate transfer chamber to at least one substrate processing chamber;

(e) processing the substrates within said at least one substrate process

chamber;

(f) transferring the processed substrates from said at least one process chamber into a container; and

wherein said providing of the purging gas into the substrate transfer chamber, and said re-circulating of the purging gas through the substrate transfer chamber of step (a) are continuously carried out during the steps of (b) to (f).

11. The method of processing a substrate as claimed in claim 10, wherein the step of (c) and the step of (d) comprise transferring the substrates one-by-one.

12. The method of processing a substrate as claimed in claim 11, further comprising:

(g) unloading the container into which the substrates is transferred once all of the substrates from the container disposed on the load port processed and the step of (f) is carried out.

13. The method of processing a substrate as claimed in claim 12, wherein said providing of the purging gas into the substrate transfer chamber, and said re-circulating of the purging gas through the substrate transfer chamber of the step of (a) are continuously carried out during the steps of (b) to (g).

14. The method of processing a substrate as claimed in claim 10, wherein the purging gas includes an inert gas.

15. The method of processing a substrate as claimed in claim 14, wherein the inert gas includes nitrogen (N_2).

16. The method of processing a substrate as claimed in claim 10, and further comprising measuring the humidity in the substrate transfer chamber in real time during the step of (a), increasing the amount of the purging gas being supplied into the substrate transfer chamber when the measured humidity exceeds a given value, and decreasing the amount of the purging gas being supplied into the substrate transfer chamber when the measured humidity is less than the given value.

17. The method of processing a substrate as claimed in claim 10, and further comprising filling the container into which the substrates are being transferred in the step of (d) with the purging gas from the substrate transfer chamber at the time a substrate is first transferred into the container such that the substrates in the container are enveloped by the purging gas while the substrates are transferred in the step of (f).

18. A substrate processing apparatus comprising:
a container configured to accommodate a plurality of substrates;
a substrate processing section including at least one processing chamber in which substrates are processed;
a substrate transferring module connected to said substrate processing

section, said substrate transferring module including a substrate transfer chamber, a load port disposed outside said substrate transfer chamber and configured to support said container outside said substrate transfer chamber as exposed to the ambient outside the processing apparatus, and a substrate transferring means disposed within said substrate transfer chamber and operable to transfer wafers between the container supported by said load port and said substrate transfer chamber; and

a contamination controlling system including a gas inlet port connected to said substrate transfer chamber and through which purging gas is supplied into the substrate transfer chamber, and a gas circulating tube extending outside said substrate transfer chamber and connected to respective portions of said substrate transfer chamber spaced from one another along a length of the chamber such that the purging gas in the substrate transfer chamber can be re-circulated through the substrate transfer chamber via said gas circulating tube,

wherein an inner portion of said container supported by said load port is filled with the purging gas provided into said substrate transfer chamber to prevent an inflow of contaminating material into said container.

19. The substrate processing apparatus as claimed in claim 18, wherein said substrate transferring means comprises a robot arm adapted to transfer the wafers one at a time.

20. The substrate processing apparatus as claimed in claim 18, wherein

said contamination controlling system further comprises a gas supply line connected to said gas supply inlet, a mass flow controller connected to said gas supply line so as to control the rate at which the purging gas is supplied into the substrate transfer chamber via said gas supply line and gas supply inlet, a sensor operable to detect the temperature and humidity in the substrate transferring chamber, and a controller connected to said sensor and to said mass flow controller so as to operate said mass flow controller on the basis of data generated from said sensor.